BEFORE THE

PUBLIC SERVICE COMMISSION

OF SOUTH CAROLINA

In Re: Complaint and Petition for Relief of BellSouth Telecommunications, LLC d/b/a AT&T Southeast d/b/a AT&T South Carolina v. Halo Wireless, Inc. for Breach of the Parties' Interconnection Agreement	)))))	**Docket No. 2011-304-C**

REBUTTAL TESTIMONY OF RAYMOND W. DRAUSE ON BEHALF OF AT&T SOUTH CAROLINA

MARCH 23, 2012

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Raymond W. Drause. I hold the position of Senior Wireless Engineer at McCall-Thomas Engineering Company, Inc. I provide engineering support to various telephone companies and electric co-operatives. My business address is 845 Stonewall Jackson Boulevard, Orangeburg, South Carolina.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A. I am a Registered Professional Engineer. I graduated with honors from Herzing University, in Madison, Wisconsin, with an Associate of Science in Electronics Engineering Technology degree. I have worked for over 42 years in the telecommunications engineering field. I have been employed by McCall-Thomas Engineering Company for the past five years as Senior Wireless Engineer. My experience includes the design, installation and operation of switching, transport, fiber optic, wireless, video and power systems.

My work assignments over the past 42 years have ranged from large and well established companies, such as AT&T and Southwestern Bell, cutting edge regional companies in the CLEC industry such as NewSouth Communications and NuVox Communications as well as telecommunications providers serving single communities. My responsibilities for these assignments have ranged from detailed engineering of individual telecommunications systems to the overall engineering management of entire multi-state telecommunications networks. A more detailed summary of my work experience is included as Exhibit RD-1.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of AT&T South Carolina.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to address portions of the direct testimony of Russ Wiseman and Robert Johnson, both of which were filed on behalf of Halo Wireless, Inc. ("Halo") on March 9, 2012.[1]

Q. HAVE YOU PREVIOUSLY TESTIFIED ON THE SUBJECT MATTER YOU TESTIFY ON HERE?

A. Yes. I presented similar testimony in a related case in Wisconsin, Public Service Commission of Wisconsin Docket No. 9594-TI-100 (*Investigation into Practices of Halo Wireless, Inc. and Transcom Enhanced Service, Inc.*) (the "*Wisconsin Halo Investigation*").

Q. WHAT MATERIALS HAVE YOU REVIEWED IN ORDER TO PROVIDE YOUR TESTIMONY?

A. I have reviewed various testimony, exhibits and transcripts as well as the Airspan specification documents and technical user guides for the equipment installed at the Halo tower site in Orangeburg, South Carolina. Specifically, I reviewed the following documents:

1. Pre-filed Rebuttal Testimony of Russ Wiseman. I also reviewed Mr. Wiseman's similar testimony in the *Wisconsin Halo Investigation.*

[1] The cover page of Mr. Johnson's testimony says, "on Behalf of Transcom Enhanced Services," but counsel for AT&T South Carolina informs me that Transcom is not a party to this proceeding. Mr. Johnson explains in his testimony (at page 3), that he is actually testifying on behalf of Halo.

2. Pre-filed Rebuttal Testimony of Robert Johnson. I also reviewed Mr. Johnson's similar testimony in the *Wisconsin Halo Investigation.*

3. Halo Wireless, Inc., and Transcom Enhanced Services, Inc.'s 2nd Amended Responses to Staff Data Request #1, dated January 11, 2012, in the *Wisconsin Halo Investigation.*

4. Halo Wireless, Inc., and Transcom Enhanced Services, Inc.'s Amended Responses to Supplemental Staff Data Request #1, dated January 20, 2012, in the *Wisconsin Halo Investigation.*

5. Transcripts of the hearing conducted in the *Wisconsin Halo Investigation* on February 28-29, 2012.

6. January 23, 2012, Transcript of Proceedings before the Tennessee Regulatory Authority in Docket No. 11-00108 In Re: Complaint of Concord Telephone Exchange, Inc.; Humphreys County Telephone Co.; Tellico Telephone Company; Tennessee Telephone Company; Crockett Telephone Company, Inc.; Peoples Telephone Company; West Tennessee Telephone Company, Inc.; North Central Telephone Coop., Inc.; and Highland Telephone Cooperative, Inc. against Halo Wireless, LLC; Transcom Enhanced Services, Inc. and other affiliates for failure to pay terminating intrastate access charges for traffic and other relief and authority to cease termination of traffic.

7. Equipment Lease between SATNet, LLC and Halo Wireless, LLC, dated June 1, 2010.

8. Proffer of Testimony of Russ Wiseman on behalf of Halo Wireless, Inc., the Debtor in Case No. 11-42464-BTR-11, In Re: Halo Wireless, Inc., Debtor, before the United States Bankruptcy Court for the Eastern District of Texas Sherman Division.

9. Product Specification: Airspan WiMAX MiMAX-Pro V-Series.

10. HiperMAX Product Specification.

11. HiperMAX Technical User's Guide - HiperMAX Commissioning - SDR-micro.

12. HiperMAX Base Station Data Sheet.

I was aided in my understanding of the documents by the experience I have acquired while providing engineering type work for engineering communications projects that utilize Airspan WiMAX and pre-WiMAX systems.

Q. HAVE YOU VISITED THE HALO TOWER SITE IN ORANGEBURG, SOUTH CAROLINA?

A. Yes. AT&T's attorney arranged a visit to the site, and I spent about one hour and twenty minutes there on March 21, 2012. I had a chance to look at and photograph the Halo and Transcom equipment I describe in this testimony, and to get a good like at the site.

Q. PLEASE GIVE AN OVERVIEW OF THE STRUCTURES AT THE ORANGEBURG SITE.

A. There are three structures: two small buildings and a tower. You can see them on Exhibit RD-2, which is a photograph I took during the site visit. The concrete building housing the Halo and Transcom equipment is the brownish structure on the right side of Exhibit RD-2. It is about 24 feet long, 10 feet wide and 10 feet tall. The base of the wireless tower is about 10 feet from the side wall of that building.

Q. BASED ON THE DOCUMENTS YOU REVIEWED AND YOUR VISIT TO THE SITE, DO YOU HAVE AN UNDERSTANDING OF THE EQUIPMENT LOCATED AT THE TOWER SITE IN ORANGEBURG, AND THE FLOW OF TRANSCOM AND HALO TRAFFIC?

A. Yes. As a result of my examination of the documents and the site visit, I have a high-level understanding of the equipment used by Halo and Transcom at the tower site in Orangeburg, as well as at the other Halo tower sites across the country. The documents I reviewed and my observations during the site visit provided sufficient information to permit me to create a site drawing included with my testimony as Exhibit RD–3, that conceptually illustrates the significant pieces of Halo and Transcom equipment located at the tower site in Orangeburg, which, according to Mr. Johnson's and Mr. Wiseman's

referenced testimonies, is similar to the equipment located at other Halo tower sites across the country. The documents that I reviewed and my observations during the site visit also provided information about how a telephone call would enter a tower site and pass between the various pieces of equipment at the tower site before being sent on to a Halo POP for delivery to a tandem switch. I used that call-flow information to populate the site drawing (Exhibit RD–3) with lines and arrows which illustrate the manner in which a telephone call would flow through the various types of equipment at the tower site. Exhibit RD–3 also references equipment and systems installed at other locations that interoperate over unspecified transmission facilities with the tower site equipment. The Dallas soft-switch is illustrated on Exhibit RD–3, and is an example of an important system that interoperates with the tower site equipment.

Q. BASED ON THE DOCUMENTS YOU REVIEWED, YOUR SITE VISIT, AND YOUR EXPERIENCE IN THE INDUSTRY, HOW WOULD YOU DESCRIBE THE FLOW OF A TELEPHONE CALL THROUGH THE ORANGEBURG SITE?

A. The IP data stream that is carrying the telephone call enters the building at the tower site and passes through a Cisco Router and a Extreme Networks Fast Ethernet Switch (labeled on Exhibit RD–2 as Switch/Router Cloud) before being sent over a CAT5 cable to Transcom's Airspan MIMAX Pro-V Customer Premise Equipment. The functionality that the Airspan MIMAX Pro-V provides is to take the IP data stream that is presented to it over the CAT5 cable, convert it to a 3.65GHz radio signal and transmit it to Halo's Airspan SDR-Micro Base Station. The function of the Airspan equipment is merely to transport the IP data stream from one place to another. More specifically, from the Airspan MIMAX Pro-V Customer Premise Equipment that is mounted on a pipe attached

to the building near the base of the tower to the Airspan SDR-Micro Single Channel RF Transceiver that is mounted on the tower and then back down the tower over a fiber optic cable to the Airspan SDR-Micro Base Station that is located in the building. The Airspan SDR-Micro Base Station system converts the wireless IP data stream that it receives from the Airspan MIMAX Pro-V Customer Premise Equipment back into a form that can be sent over a CAT5 cable. From there the IP data stream is carried over a CAT5 cable to the Extreme Networks Fast Ethernet Switch and then to the Halo Router located in the building. The IP data stream leaves the Halo Router and is transported over unspecified facilities to the softswitch cloud in Dallas. The IP data stream is handled by the equipment in the Dallas Softswitch Cloud, then leaves the Dallas Softswitch Site and is sent over unspecified facilities to a Halo point of presence ("POP") in another city. At the Halo POP, the IP data stream carrying the call may undergo a conversion from IP to TDM, and is sent to a tandem switch for delivery to a subtending office where the call terminates.

Q. IN YOUR OPINION WHAT ENGINEERING PURPOSE IS SERVED BY THE WIRELESS CONNECTION BETWEEN THE TRANSCOM CUSTOMER PREMISES EQUIPMENT AND THE HALO BASE STATION?

A. The only purpose is to include a wireless transportation segment. If we review the call-flow, we discover that the IP data stream carrying the call enters the CAT5 cable connected to the Airspan MIMAX Pro-V Customer Premise Equipment, travels through this customer premises equipment over the 3.65 GHz radio link to the Antenna and Airspan Tranceiver and then onto the Airspan Base Station. The call-related characteristics of the IP data stream that emerges from the Airspan Base Station are

unchanged from the form they were in when they entered the Airspan MIMAX Pro-V Customer Premise Equipment. The Airspan Customer Premises Equipment and Base Station serve no networking purpose other than to carry the IP data from one point within the building to another point within the building. The Airspan equipment does not contain externally controlled, dynamic Ethernet switching apparatus and cannot modify the content of the IP data stream to change call-related routing or signaling information that it may be carrying. It appears that if the Airspan equipment were replaced by a piece of CAT5 cable, the call could be completed just as it is today.

Q. HOW FAR DOES THE WIRELESS TRANSMISSION FROM THE BUILDING TO THE TOWER GO?

A. Approximately 140 feet. This is the approximate distance between Transcom's MiMAX Pro-V wireless equipment that's mounted on a pipe bolted to the wall of the building and Halo's antenna that's mounted on the tower, the base of which is shown in Exhibit RD-2.

Q. WOULD REPLACING THE AIRSPAN EQUIPMENT WITH A PIECE OF CAT5 CABLE HAVE ANY EFFECT ON THE RELIABILITY OF THE NETWORK?

A. Yes. By eliminating the Airspan equipment and the wireless leap from the building to the tower, the resulting configuration would actually provide a more reliable level of service. According to the Airspan HiperMAX Product Specification document, the predicted Mean Time Between Failure of hardware in the SDR-Micro Base Station is 115,000 hours. This is not as reliable as the CAT5 copper wire. Also, all of the packet loss, jitter and latency that are inherent in the wireless connection would be totally eliminated.

Q. IN YOUR OPINION IS THE AIRSPAN MIMAX PRO-V CUSTOMER PREMISE EQUIPMENT CAPABLE OF ORIGINATING A CALL?

A. No. None of the Airspan equipment, including the MIMAX Pro-V Customer Premise Equipment, the Airspan SDR-Micro Single Channel RF Tranceiver, and the Airspan SDR-Micro Base Station, contains externally controlled, dynamic Ethernet switching apparatus that might be used for call routing. In other words, all the Airspan Customer Premises Equipment does is convert the IP data stream it receives into a radio signal. This is unlike a wireless handset, which contains intelligence capable of creating the data stream which instructs the wireless telephone network where to send the telephone call.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

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EXHIBIT RWD-1

Raymond W. Drause, P.E.

40 Keenan Creek Way ◊ Simpsonville, SC 29680 ◊ (864)-444-7839 ◊ rdrause@charter.net

PROFESSIONAL SUMMARY

Results-driven Engineering Manager with multi-faceted Telecommunications Engineering and Operations experience. Strong general management qualifications in planning, project management, budgeting and human resources. Extensive experience in Network Planning, Engineering, and Operations in both start-up and large-scale companies.

CAREER EXPERIENCE

McCall-Thomas Engineering Company, Inc. — May 2007 - present
Senior Wireless Engineer

Provide engineering support to various Independent Telephone Companies and Electric Co-ops.

- Develop Point-to-Point and Point-to-Multipoint wireless system designs using UHF and Microwave Radio Systems.
- Coordinate installation and testing of wireless systems.
- Coordinate with the Department of Defense Joint Spectrum Center to facilitate installations of Cellular Mobile Radio System equipment on military facilities.
- Develop fiber optic network designs using Passive Optical Networks (PONs).
- Provide training on National Electrical Safety Code, Providing IPTV over ADSL2+, Central Office Grounding (single point grounding), Network Interface/Optical Network Terminal bonding and grounding, Basic Electronics.
- Develop and present instructional technical programs to SC Telephone Assn., Georgia Telephone Assn., NC Tri-State Telephone Assn. and others.

Telecommunications Consulting Service — May 2006 – April 2007
Owner

Establish a telecommunications consulting service to provide engineering and operations support for a client group founding a new telecommunications company.

- Work jointly with client's IT manager to develop, deploy and operate the core network infrastructure needed to support VoIP and data services.
- Evaluate WiMAX systems. Design, deploy and operate point-to-multipoint wireless systems that link subscribers to client's network. Conduct RF spectrum analyses. Design and deploy custom antenna arrays required to serve targeted coverage areas and null designated areas. Develop "best practices" for equipment installations at customer sites. Conduct field trials to confirm system performance levels.
- Design and install point-to-point microwave systems. Conduct path surveys, negotiate tower leases. Acquire Metro-Ethernet circuits for back haul of traffic from main hub.
- Design backup AC and DC power systems for network and operational support systems.

Nuvox Communications, Greenville, SC May 2004 (merger) – May 2006

Vice President – Network Planning, Engineering & Optimization
November 2005 – May 2006

Senior executive responsible for leading 7 Director organizations in planning, engineering, budgeting and deploying the equipment, facilities and systems making up the Nuvox Network.

- Deploy Voice and Signaling Gateways, Feature Server, Session Border Controller, and Voice Mail platform required for VoIP implementation. Integrate VitalNet and Empirix Network Performance Management systems into VoIP engineering processes.
- Establish Traffic Engineering and Capacity Management processes providing enhanced visibility to VoIP and Core Data Networks performance.
- Support interoperability testing of VoIP elements.
- Develop Transmission Engineering Standards for SONET/ DWDM designs. Deploy DWDM rings utilizing Lucent DMX and Cisco ONS multiplexers.
- Develop interim growth architecture for legacy TDM network, reducing CAPEX requirements by over 27%. Introduce E911 data warehouse plan yielding ongoing annual OPEX savings of over $1.5 million.
- Create and implement Capacity Management initiative to achieve "zero capacity-related held customer orders".

Vice President – Network Optimization
February 2005 – October 2005

Senior executive responsible for development and implementation of initiatives designed to optimize the financial and operational performance of the Nuvox Network.

- Create new multi-state organization. Direct hiring and training of 100+ contractors and integrate them into a base of 52 employees to execute Network Optimization initiatives.
- Manage a diverse array of Operational Excellence initiatives in 15 state area.
- Implement extensive network changes arising from the FCC TRO rulings. Negotiate changes to ILEC Interconnect Agreements. Responsible for MSS circuit designs, switch and router translations, ILEC circuit ordering and physical grooms at collocation sites and customer locations. Produced recurring annual savings of over $1.45 million.
- Integrate network and customer-specific data residing in two legacy MetaSolv TBS Systems and one internally developed OS into one common data repository (MSS).
- Implement conversion of customer facilities to HDSL2, producing ongoing annual savings of over $1.2 million.

Vice President – Network Engineering
May 2004 – February 2005

Senior executive responsible for engineering, deployment, capacity management and budgeting of the equipment and systems making up the Nuvox Network.

- Integrate the Network Engineering organizations of Nuvox Communications and NewSouth Communications following their merger.
- Manage Network Integration projects designed to capture operational synergies and cost benefits resulting from the merger (Migration of circuits from 5ESS/DMS switches to Sonus switch, deployment of Adtran GR303 equipment to collocation sites).
- Manage initial deployment of Sonus and Cisco VoIP equipment to new markets.

NewSouth Communications, Greenville, SC November 1999 – April 2004 (merger)

***Vice President – Network Engineering* & Technical Services**
July 2000 – April 2004

Senior executive responsible for engineering, deployment, capacity management and budgeting of the equipment and systems making up the NewSouth network.

- Lead 4 Director organizations in the construction and ongoing growth of 13 switch sites and 230 collocation sites located across the Company's 10 state area.
- Manage the engineering and installation of Cisco ATM switches, Lucent 5ESS and Siemens EWSD switches, Alcatel and Tadiran DCSs and all ancillary equipment.
- Establish CAPEX and OPEX budgeting processes for Engineering.
- Establish Capacity Management and Network Data Integrity processes.
- Manage engineering-related activities associated with UCI Communications and Nuvox Communications mergers.

Director – Network Engineering
November 1999 - June 2000

Responsible for the design and build-out of Lucent 5ESS switch sites and collocation sites, including all AC/DC power, data networking, transport equipment, and mechanical systems in the NewSouth Network.

Southwestern Bell Telephone Company, Little Rock, AR 1980 – 1999 (retired)

Area Mgr. - Maintenance & Transmission Engineering
1992 – June 1999 (retired)

- Lead a team of 15 Engineers and support personnel located in Arkansas, Kansas and Oklahoma. Provide advanced technical support for ATM , TDM and Electronic switches and associated transport, power and radio systems in over 360 central offices.
- Develop and implement Operational Test & Analysis Review processes for switch, transport and power equipment. Conduct COE Installation Supplier Quality assessment audits and Network Reliability audits. Conduct grounding and bonding audits.
- Create transmission designs for fiber optic cable routes, and SONET, microwave and VHF/UHF mobile radio systems. Responsible for Network Synchronization.
- Conduct Beta testing during SONET and ATM equipment trials.
- Served on SW Bell/Pacific Bell Merger Team - Developed "Seven State Process" which assessed "Best Practices" used by each company, leading to the adoption of uniform Maintenance & Transmission Engineering processes across the combined company.
- Pioneered use of Infrared Scanners for central office power inspections and use of unlicensed spread-spectrum 2.4 GHz radio for emergency restorations and facility relief.

Area Mgr. - Real Estate & Architecture
1980 – 1991

- Manage and coordinate five teams of architectural project managers, engineers and consultants in planning, designing and implementing central office, radio and administrative building projects. Manage annual CAPEX budget of $7,900,000.
- Select and hire contractors and consultants. Establish performance standards. Develop and direct engineering records mechanization process.
- Manage and supervise the planning, negotiating, purchasing and leasing of land, buildings and floor space. Administer $2,400,000 annual leasing budget. Personally negotiate/administer $1,200,000 in annual leasing and brokerage transactions.
- Conduct economic studies. Develop lease documents and investor solicitation packages for build/lease projects. Represent company in zoning/land-use hearings. Acquire microwave and cellular tower sites.

Wisconsin Bell Telephone Company, 1969 – 1979

Engineer – Central Office Equipment Planning ***Milwaukee, Wisconsin***
1978 - 1979

- Conduct Network Planning economic studies involving central office projects.
- As member of Speakers Panel, present company programs to civic clubs and schools.

Assistant Engineer – Central Office Equipment Engineering ***Madison, Wisconsin***
1969 - 1977

- COE Engineering for switching, transport and power equipment.
- Developed first plan in company for reuse of MDF for dial-to-dial conversions.

Education:
Associate in Science - Electronics Engineering Technology
Herzing College - Madison, Wisconsin

Specialized Training:
Numerous technical, management, building and real estate courses from Greenville Technical College, Nortel, Lucent, Fujitsu, Alcatel, Cisco, Telcordia, Southwestern Bell Center for Learning and others. VoIP Analyst Certification – Spirit Telecom. MS Office proficient.

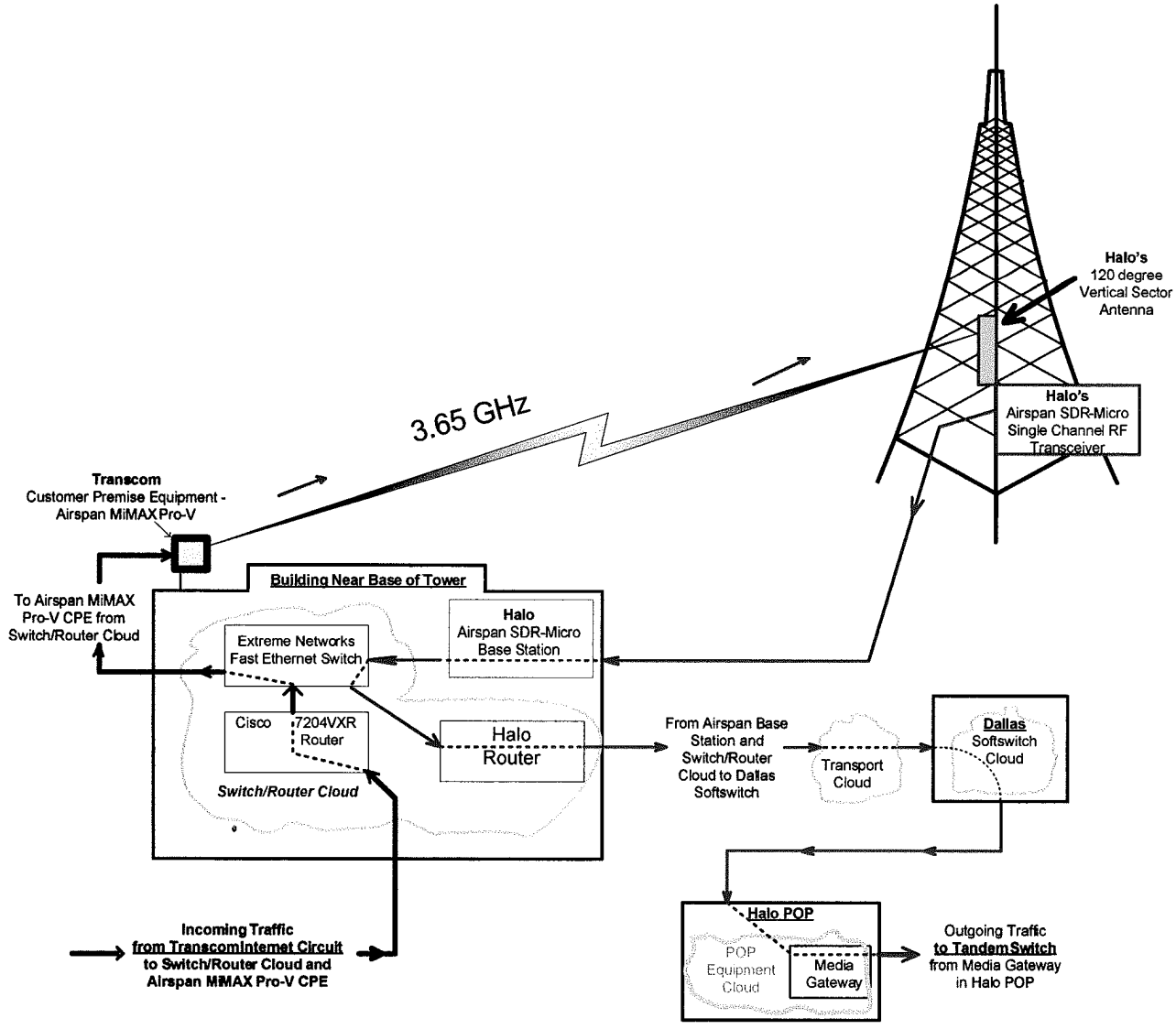
Professional Licenses:
Registered Professional Engineer (Electrical) - Arkansas
FCC Radio License
Real Estate Broker's License (lapsed)

Affiliations:
National Society of Professional Engineers (lapsed)
Institute of Electrical and Electronics Engineers (lapsed)
American Radio Relay League

EXHIBIT RWD-2


KUBO

EXHIBIT RWD-3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Vertical Sector
Antenna
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Airspan SDR-Micro
Single Channel RF
Transceiver
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Transcom
Customer Premise Equipment -
Airspan MiMAX Pro-V
To Airspan MiMAX
Pro-V CPE from
Switch/Router Cloud
Building Near Base of Tower
Halo
Airspan SDR-Micro
Base Station
Extreme Networks
Fast Ethernet Switch
Cisco 7204VXR
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Switch/Router
Cloud to Dallas
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Halo POP
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Gateway
Outgoing Traffic
to Tandem Switch
from Media Gateway
in Halo POP
Incoming Traffic
from Transcomintemet Circuit
to Switch/Router Cloud and
Airspan MiMAX Pro-V CPE

STATE OF SOUTH CAROLINA)
) CERTIFICATE OF SERVICE
COUNTY OF RICHLAND)

The undersigned, Nyla M. Laney, hereby certifies that she is employed by the Legal Department for BellSouth Telecommunications, LLC d/b/a AT&T Southeast d/b/a AT&T South Carolina ("AT&T") and that she has caused AT&T South Carolina's Rebuttal Testimony of Raymond W. Drause in Docket No. 2011-304-C to be served upon the following on March 23, 2012:

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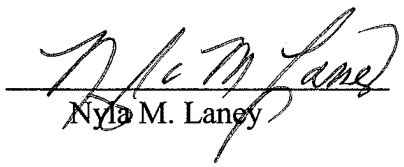

Nyla M. Laney

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